

AVIATION WEEK

A McGRAW-HILL PUBLICATION

DEC. 20, 1948

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L-M-Bartow pioneered high intensity lighting, and is today's leader both in quality and number of installations. The list shows some recent users of L-M-Bartow high intensity systems. Only the fully controllable beam permits the very high controlled intensities, up to 180,000 beam candlepower. This gives maximum penetration, *without glare*, reaching out further to "bring 'em in alive" when every foot of distance counts. For information on this and other engineered lighting for all sizes of airports wire or write Airport Lighting Division, Line Material Co., East Stroudsburg, Pennsylvania.



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Illustrated is the new Bendix
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Engineered for precise remote instrumentation on guided missiles, aircraft and for industrial use, Bendix-Pacific Telemetering Systems incorporate time-tested subminiature components which offer many special advantages.

Bendix-Pacific Systems have demonstrated their ability to withstand extreme vibration and shock and still accurately measure velocity, current, pressure, altitude, position, R.P.M., gyro gyrostatic position, compensated strain and various motion and movement. In addition to aircraft, these systems can be utilized in many industrial applications where conventional means of measurement are unsatisfactory because of inaccessibility.

Due to the unusually small size of the Bendix-Pacific units, a typical electronic system complete with power supply and transmitter can be packaged in 110 cubic inches of space and weighs less than 12.5 lbs. They can be used on 80-81 mc or 230-232 mc.

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| Pressure 0-100 psi | 0.05 lbs (T-10 A) | |
| Pressure transducer 100 psi | 0.05 lbs (T-10 A) | |
| Pressure transducer 1000 psi | 0.05 lbs (T-10 A) | |
| Position 0-360 deg. | 0.05 lbs (T-10 A) | |
| Velocity 0-1000 in/sec | 0.05 lbs (T-10 A) | |
| Velocity 0-1000 in/sec | 0.45 lbs (T-10 A) | |
| Strain gauge Quadrant | 0.1 lbs (T-10 A) | |
| Temperature probe Quadrant | 0.1 lbs (T-10 A) | |
| Voltage Quadrant | 0.1 lbs (T-10 A) | |
| Current Quadrant | 0.15 lbs (T-10 A) | |

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Through these hundreds of tests—through the study of more than 1100 additional fires in mockups—Walter Kidde & Company, Inc., has earned a wealth of fire-fighting information unrivaled by any other private organization. We are always ready to place this information at the disposal of government agencies, plane manufacturers and transport companies.



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Kidde

Walter Kidde & Company, Inc.

AVIATION WEEK, December 20, 1960

• 1918 Main St., Belleville 9, N.J.

**VERSATILITY
ECONOMY
ADAPTABILITY**



Critical future planning will call for versatile AVITRUC cargo planes. Their adaptability to emergency conditions plus their primary feature of rapid loading and unloading of troops or cargo, makes AVITRUC a "must" item in any program.



AVIATION CALENDAR

Dec. 15-16—University Park, Penn. Course for students and teachers, Monmouth University participants of aerodynamics.

Jan. 2-10—Midway Fly-in, Allentown, Penn. Midway Inn, Allentown, Penn.

Jan. 2-5—Meet at American Air Show, Las Vegas, Nev.

Jan. 10-11—National Aircraft Electronics Council meeting, Los Angeles, Calif. AIA offices, Los Angeles.

Jan. 10-12—Aviation Handling Show, sponsored by the American Society of Mechanical Engineers, Convention Hall, Philadelphia.

Jan. 11-14—Society of Automotive Engineers Annual Meeting and Engineering Display, Hotel Hawk Gallatin, Detroit, Mich.

Jan. 11—GARD Commandant's Review, Kirtland.

Jan. 12—AIA annual meeting, Atlanta, DeKalb, Atlanta, Georgia.

Jan. 13-14—Commercial Space Operations Conference, University of Illinois, Urbana, Ill.

Jan. 16-18—Poughkeepsie AIAI meeting, AIA offices, Poughkeepsie, N.Y.

Jan. 20-22—National Aircraft Builders Council meeting, Los Angeles.

Jan. 24-26—The 10th International Congress of the American University Association, Hotel New Yorker, New York City.

Jan. 26-27—AIA aircraft show, Hotel New Yorker, New York City.

Jan. 31—Meeting of Automotive Engineers, Hotel New Yorker, New York City, and meeting of the Mechanical Engineering Society, Hotel New Yorker, New York City.

Feb. 2—GARD Operations division, Kirtland.

Feb. 20-22—Aircraft Owners, Atlanta, Ga.

Mar. 4-6—Meeting of Automotive Engineers, Hotel New Yorker, New York City, and meeting of the Mechanical Engineering Society, Hotel New Yorker, New York City.

Apr. 11-13—American Association of Airport Executives, Hotel New Yorker, New York City.

Apr. 12-14—Meeting of the American Metal Processing Institute, Hotel New Yorker, New York City.

Apr. 15-16—Western Metal Congress and Exhibit, sponsored by American Society for Metals, Hotel New Yorker, New York City.

Apr. 22-23—Flight Equipment Northern California Regional Meeting, Allentown, Penn.

Apr. 23—GARD York Office regional meeting, meeting, Hotel New Yorker, New York City.

Aug. 24—GARD Alabama/Florida annual meeting, Mobile, Ala.

Aug. 25—Precision Aerodynamics Internationale, Hotel New Yorker, New York City.

PHOTO CREDITS

15—Chase Aircraft, Allentown, Calif.
16-17—1948 AIAI, Fall Aircraft Conference, Hotel New Yorker, New York City.
18—GARD, Hotel New Yorker, New York City.
19—TWA, 71st Street, New York City.



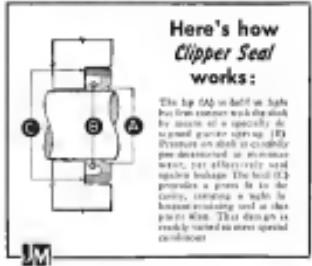
Twist it... squeeze it... drop it... hammer it—the new one-piece concentric molded J-M Clipper Seal has plenty of give and take to help it stand up in service.

This flexibility has its advantages. The Clipper Seal's hard, tough outer helix, for example, is resilient enough to conform even to a slight cut or round cavity. Yet the soft, pliable inner lip always maintains a tight, but positive sealing pressure on the shaft, with maximum wear on the seal.

The simple design of Clipper Seals also assures quick, easy installation, and permits removal without damage so that the seal may be used again. And because Clipper Seals are entirely non-metallic, they eliminate any possibility of electrolytic corrosion.

Clipper Seals are made in both split and endless types... are available for shafts in sizes from $\frac{1}{2}$ " I.D. up to $6\frac{1}{2}$ " O.D. They are for sealing against

oil, grease, water, coolants at operating temperatures up to 450°F . Write for folder PK-31A to Johns-Manville, Box 290, New York 16, N. Y.



Here's how Clipper Seal works:

This diagram shows how the seal is made by means of a specially designed press. First, the outer helix (C) is pre-deformed or crimped, yet effectively held against the inner lip (B). Then the inner lip (B) provides a groove in the cavity, creating a tight fit between sealing and shaft when the design is completed and no more spreading occurs.

Johns-Manville

PACKINGS & GASKETS



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• CURTISS AUTOMATIC SYNCHRONIZATION makes propeller RPM control and engine IDLE RPM a simple, one-hand, finger-tip operation for pilots of modern multi-engine aircrafts.

• A single lever propellers are natural—located in the cockpit—establishes the constant speed strong for each flight condition.

... and at the same time maintains accurate synchronism—reduces 40%—of all engines down to an automatic synchronization motor unit.

• As a result, CURTISS AUTOMATIC RPM REGULATION... eliminates worry, tiring, vibration in engine "heat."

releases the pilot for other important chores during take-off, climb, let down and landing.

... assures more comfort and relaxation for himself, his crew and his passengers.

Other famous Curtiss Propeller features include reverse thrust and kefko steel blades. Like automatic synchronization, these features were first introduced to service by Curtiss and serve-proven on commercial aircraft and military aircraft.

PROPRIETARY DIVISION CURTISS-WRIGHT CALDWELL, NEW JERSEY

CURTISS ELECTRIC PROPELLERS

AVIATION WEEK, December 29, 1948

NEWS DIGEST

DOMESTIC

Philip S. Hopkins, vice president of East Aviation, Tex., was given Bestjet Award by National Association Arts for contributions to aviation education in 1948. He is president of the Douglass Co., N. Y., board of education.

Arthur M. Hall, manager at chairman of the National Security Resources Board, Treasury implementer in John R. Shafroth.

Hall has been instrumental in New York City will be built by a concession agency new First Ave. and 77th St. to replace part entrenched bordering at 48th St. and Park Ave. Structure, to be ready in a year, will be about ten stories, with garage and recreation Room Island in which.

Walter B. (Bett) Hall, founder and a founder of the Lufthansa Ensemble in World War I, died of heart disease in Freiburg, Ober, Germany, Aug. 62.

Airline War Training Institute received \$100,000 to Air Force Academy AWFI President S. P. Silberman explained it was balance of organization's budget for 1949. It will be used for storage of surplus and possible in-habiles. AWFI was formed during the war to collect and distribute information relative to airline pilots on war transport duty.

FINANCIAL

Bell Aircraft Corp. declared dividend of \$3 a share payable Dec. 25 to holders of record Dec. 21 pursuant to be made from earnings.

National Airlines Aviation, Inc. declared dividend of \$10 a share payable Dec. 25 to holders of record Dec. 17. Stockholders were not paid Sept. 29.

Spartan Corp. declared \$1 semi-annual dividend payable Dec. 25 to holders of record Dec. 17.

Curtiss Aeroplane Co. reported profit of \$372,000 for last month Sept. 30 as sales of \$14,295,221, nearly one-half from non-airplane production.

Brock Aircraft Corp. declared regular stock dividend of one-half share for each share of outstanding common and preferred stock held on record Dec. 15 (payable also as dividend stock), both payable Jan. 25 to holders of record Dec. 31. For fiscal year ending Sept. 30, profit was \$2,211,624. Oct. 1 backlog was \$17,600,000.

FOREIGN

French Air Force has taken five British delivered Vampires in service trials, with the strong possibility that they will be further delivered from British of Vampires schools that now exist.

AVIATION WEEK, December 29, 1948

INDUSTRY OBSERVER

► Navy has finally selected 10 contractors to be purchased with their fiscal 1949 procurement funds. Awarding proposal is a contract for 25 North American AF-1堪萨斯城和 F-86佩刀式喷气式战斗机 planes for carrier use, and two Lockheed Constellation transports. The latter will be equipped with special radar equipment and will be used for picket and anti-submarine duties.

► Lockheed is working on a new twin-engine freight plane designed for overseas transcontinental service. The new design, known as the L-185, is being pushed for both military and commercial market.

The L-185 was developed from the basic design of the Navy F8U transport. The cargo plane will use the same wing and empennage in the F8U.

A new model of the Shooting Star series of fighters is also in the mill. It will be three feet longer than the F-86C or approximately the same length as the two-seat trainer version (TF-86C) now being built for both the Air Force and Navy.

► Secretary of Air Force Swanson reveals that the cost of propellers for B-52 bombers is \$164,000, which is \$40,000 more than the total fiscal annual budget for the Air Force in 1949.

► McDonnell has received a twin-engine helicopter project (DH-1) after choosing the massive vibration that caused early shattering of the project. Shock-absorbed major heads eliminated most of the vibration and McDonnell now expects good performance from the model.

► First prototype plane for B-52 bombers has been developed by Coast Guard Cmdr. Frank Fricker. Big problem was developing controls for flying sideways and backwards.

► French military aviation nations here in this country will concentrate on Republic and Dassault. Big French need is for jet fighters and they are probably interested in Dassault's experience in building an engine for the British Meteor jet engine. France plans a similar deal with the British's engine.

► Czechoslovakia has purchased four Avia B-12 transports. The B-12 is a Royak-designed 24-passenger monoplane triplane gear transport. Rotoravia domestic in Italy is now operating a fleet of about 200 B-12 transports. Negotiations for Czech purchase of four giant IL-10, 70-passenger transports, are in progress. They will be used on the Czech's route to India.

► Air Force is installing a moving target indicator on its radio control radar at Templehof Aerodrome, key spot on the Berlin bridge. Crew from Technical Instruments Laboratories, Minneapolis, Minn., N. Y., is handling the installation. The moving target indicator eliminates all ground clutter on the radio scope and controls only moving targets thus giving a clearer picture of air traffic within radar range.

► Pan American Airways plans to have Sikorsky helicopters by the end of January. There will be used on the San Francisco-Honolulu route; one on the Atlanta and over extended for training. In fact, the Port of New York Authority's has an option of more than 100,000 lb gross weight at LaGuardia. PAA is quickly gathering airport data. Boeing is effort of Stratocruiser landings and takeoffs on Seattle Airport, which it plans to present to the Port Authority as effort to obtain permission to operate Stratocruiser from LaGuardia.

► Royal Canadian Air Force procurement funds, include an order by Royal Canadian Air Force for 29 Canadair-built DHC-4M North Star transports from Canadair Ltd., Montreal, at cost of \$18,000,000, fulfilling and modernizing 20 RCAF service planes at estimated cost of \$10,577,000, expenditure of some \$1,000,000 for engine research and experimental construction at A V Roe Canada Ltd., Toronto, purchasing of military aircraft from United States and Coast Guards at cost of \$7,000,000.

HEADLINE NEWS



AT STAKE, principally, in Pan American's proposed purchase of American Overseas Airlines are three new trans-Atlantic routes

of the two companies. AOA also has a bid to Southwicks on board. The pending sale of these new trans-Atlantic routes

original makes a sound study for merger. Route certificates for both routes extend beyond the points shown.

PAA-AOA Deal Now Up to Government

Pan American to buy Atlantic rival with a stock transfer involving no cash payment.

By William Krueger

In the bidding, most financially experienced understanding of aviation affairs believe Pan American Airways has moved to strengthen its position on the North Atlantic by buying its closest direct competitor and oldest U.S. rival, American Overseas Airlines.

American Overseas has agreed to sell all its assets to PAA in exchange for stock in PAA, but the sale has a long road to travel before completion. Analysts wait again on the value of the two companies as a basis for the stock transfer. The Civil Aviation Board must approve the sale and the President may have to pass on some aspects of it. Stakeholders of the two companies want to know if Pan American Corp. will acquire all the stock of Pan American Corp., a total of 39 million shares at par value of \$1.50, of which 6,145,000 are issued.

CAB Question—No one knows yet exactly what the Board will do in Top Cabin. The Board seems inclined not to formalize the agreement in CAB and AOA executives but were told the Board would not put an option on sale until the case came before it. Petitions for approval, together with the sales agreement, was filed last week. CAB is believed that the President will have to okay the deal, as it involves foreign routes.

All conditions of the sale haven't been fulfilled in as smooth, AOA and CAB are caused the deal. But by first time both companies hope the government will approve it. So, too, what will happen, as set out in the agreement, when the case comes before the CAB.

Pan American Airlines, Inc. (the operating company) will acquire all the stock of Pan American Corp. (holding company), a total of 39 million shares at par value of \$1.50, of which 6,145,000 are issued.

The two companies must each hold stockholders' meetings within 45 days after government approval. Pan Am Corp. is bound itself over to PAA, Inc., and

AVIATION WEEK, December 20, 1948

AOA is bound or what PAA's offer for AOA separation from American Express to AOA's part in the transaction is likely to come at or just prior to the stockholders' meeting.

Assuming the stockholders approve, the PAA stock would be distributed to AOA's stockholders. Then AOA would be dissolved and PAA could not use the word "Overseas" in its title or operations ever again.

Voting—Trans-American Airlines, as the largest stakeholder in AOA, would wind up a substantial stakeholder in Pan American. So the sales agreement provides for a voting trust to hold that stock. One trustee would be selected by American, one by PAA and the third by mutual agreement. The trust would have a life of seven years and could be extended another three years. It is AOA's intention to dispose of its Pan Am stock, either on the market under controlled conditions or in distribution to AOA's stockholders.

PAA, too, would acquire from AOA, in addition to certificates, various intangibles and other tangible items, twice L-19 Constitutions for DC-4s and the eight Boeing Stratocruisers AOA has on order. The agreement permits AOA to sell one DC-4 for each Stratocruiser delivered in the interim.

Obviously, it is understood that the majority of AOA's Stratocruiser deliveries that sometime late in January or early in February, was one of the key factors in AOA's decision to sell to Pan Am. The eight planes will cost about \$15 million. AOA has paid about \$4 million in cash to date, so there is still to be accounted for a little more to cover the balance, but it does not show on the balance sheet of AOA and PAA sources feel confident that the stipulation that PAA obtain losses of \$10 million will easily be met over cost of AOA's Stratocruiser.

The agreement is so important that the agreement will be canceled if PAA can't close the merger. This loan would let AOA have.

South Pacific—But even more revealing are the reasons for the sale submitted by AOA President G. R. Smith. The AOA president says the company and owners want to strengthen the U.S. and European markets because the U.S. and Europe, he feels, have the largest potential. The fact that the foreseeable volume of business does not justify the continuation of their competing U.S. carriers in the North Atlantic route, the increased activity which will be required to sustain their energies and the difficulty of raising the additional capital which will be required for the future.

Smith, after about five years, thus far have finally scurried the basic fleet of PAA Panair Lines to Tripoli that U.S. carriers should not compete with them when they also have to compete with foreign airlines.

At late in November the sales agreement was terminated Dec. 15 AOA still was gaining ground on its 9134 route



C. R. Smith



Jim Trapp

routes over the North Atlantic. It flew 14,000 miles nonstop in November 1948. In October it had flown 11,716. In October, as lead factor, said 716. Through November AOA carried 22 percent of the national traffic, as against PAA's 38 percent. TWA, the other U.S. trans-Atlantic carrier, led them both with about 25 percent.

Presently, AOA also was doing well. Through September it earned \$7,6912 thousand on total operating revenue of \$18,573,514. Its third quarter earnings were \$1,639,874.

Audit Panel—But AOA's traffic and profit have been based on figures in financial statements with U.S. and Canadian figures and the Berlin airfield. Full-fledged changes in that area would let AOA earn.

Moreover, the foreign carrier of Atlantic traffic has been growing. As a result, in Tripoli, longer lines have opened their proportion of traffic 50 percent in the past year. AOA, with its revenue certificate expiring in Feb. 1949, was faced with two alternatives: extension, expiration, or withdrawal.

Smith's company, American Airlines was established in 1930 and now wants to strengthen the U.S. and Europe. The fact that the foreseeable volume of business does not justify the continuation of their competing U.S. carriers in the North Atlantic route, the increased activity which will be required to sustain their energies and the difficulty of raising the additional capital which will be required for the future.

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company's representation in AOA, became board chairman when Smith took over ADA's presidency.

Smith resigned from ADA Nov. 19, but his action was not mentioned until after news of the impending sale became public.

Trapp was the natural adversary of Smith and Stiles. With a strong entry in entry, he turned on company's planes Clipper and thought in terms of world trade. He resolutely believed that U.S. carriers should not compete with each other when they have to compete with the rest of the world as exemplified in the Congressional hearings over the choice of routes, or commercially compete concept of operation whereby one sixth-world office would be given equal permission by the government to operate overseas.

Early after this company was eradicated to fit the Atlantic, Stiles, at the time that Smith had believed necessary, Trapp held his belief and at one time tried to bar TWA. AVIATION WEEK is told that the ADA negotiations came among Stiles, Trapp, the demonstrators who left Panair Lines, Smith and Trapp, and we are certain that these top executive executives of ADA did not like Stiles, Stiles were in progress.

Representatives—The ADA deal may have ramifications even after CAB approves. The agreed-upon Pan American Express Line stock of \$10 million could not be matched with the stock of American, CAB ordered American Express Lines membership com to end its control of American Panair Lines Dec. 15. It comes from many PAA's Pan American and Andes ticket holders because Stiles retained the Air Transport Committee with the exception of American's AOA. John F. Stiles, who had helped form Andes, headed PAA, and was the chairman

of PAA's first Board. His early advocacy of the Pan American and Andes stock was to help him to concentrate on American's domestic airline at a time when both coach and freight service are beginning to take holdout.



Lawrence D. Bell



John Stack



Capt. Chas E. Yeager

X-1 Project Wins Collier Trophy

Award goes to scientist who studied compressibility, builder of plane, and pilot who passed sonic speed.

The 1947 Collier Trophy has gone to three men separating the two ends of the century's effort in achieving piloted air passage faster than the sound wave. The winners: Lawrence D. Bell (represented by Bell Aircraft Corp., builder of the X-1), Arnold Engineering, Capt. Chas E. Yeager, USAF, and John Stack, NACA's supersonic research scientist, who had the technical foundation for design of the X-1.

In thus honoring the three principal achievers responsible for the heroic achievement, the Collier Trophy awards committee has recognized the success of X-1 project in "the greatest achievement in aviation of America, the value of which has been demonstrated by actual use during the preceding year." The first piloted supersonic flight was made at Muroc Army Air Field on Dec. 14, 1947, by Major A. P. "Pete" B. Gold, and disclosure in an unknown Aviation Week story on Dec. 22, 1947.

Stack's share—John Stack's contribution to the supersonic flight program actually had its beginning in 1947 when he was assigned to research on the problem. Stack designed and built the first high-speed wind tunnel at the NACA Langley laboratory in 1939 and had developed basic research data on compressibility phenomena and the design of high-speed aircraft sections as early as 1935. By 1938 the principles of supersonic aerodynamics were thoroughly understood and in 1942 it became apparent that all the required knowledge was available for the design of a supersonic piloted aircraft.

Stack, an Army officer before designation of the problem as the X-1 in 1945 and in March, 1946 a definite program of piloted tests and supersonic research had been formulated. In December, 1946 Bell joined the program

to provide the detailed design and construction of the X-1. The first engine was completed in Buffalo late in 1945 and glide tests were carried out in February, 1946, while completion of the rocket power plant was delayed

X-1 Program.—The engine was finally installed and the first powered flight was made at Muroc Air Force Base, Calif., Dec. 14, 1946. Decompression flights continued through the spring of 1947 and the airplane was accepted by the Air Force on August 1. Yeager took over flight testing of the aircraft and attained supersonic speed for the first time Oct. 14. He has since flown at supersonic speeds in numerous occasions.

It was the combination of scientific research, research, analysis, design and construction, and auxiliary planning, extension and use, that composed the achievement which is attributed to the builders of the X-1.

The Collier Trophy would recognize the contributions between these several activities in producing a single major technological achievement.



XT-30 Mockup Is Completed

Douglas Aircraft Co. has completed the mockup of XT-30 research aircraft at its Santa Monica plant. The model was built under an experimental Air Force contract. No prototype construction is planned for the plane in a planform or for later aircraft drawing above.

Design of the XT-30 was submitted to the Air Force June 1946.

Design of the XT-30 is based on a wingspan of 16 ft 4 in. with leading edge of 16 ft 5 in. It has a tricycle landing gear and landing rating with dual controls. Craft was intended primarily as a transonic research test jet for jet pilots.

It eliminates the engine bulk in the nose giving the pilot a clear view forward.

The XT-30 was designed for a top speed of 500 mph at 13,000 ft, and a climbing rate of 170 mph, giving it an altitude of 100 ft in 15 sec. If has a design gross weight of 6,000 lb and a service ceiling of 20,000 ft.

The aircraft will have a wingspan of 16 ft 4 in. with leading edge of 16 ft 5 in. It has a tricycle landing gear and landing rating with dual controls. Craft was intended primarily as a transonic research test jet for jet pilots.

AVIATION WEEK, December 26, 1948

CAB Would Tighten Nonsked Exemption

The nation's large regular passenger carriers and their hub-and-spoke fleet members now enjoy exemptions from the non-scheduled exemption.

Proposed changes in Section 262(j) of the Economic Regulation circulated in public comment by CAB last week would terminate the general exemption of about 200 large regular airlines 30 days after the revisions become effective. Thereafter, each non-scheduled line using transport-type equipment would be permitted to operate only through an individual exemption.

Broad's Power Strengthened.—Large regular carriers acting for individual exemptions with CAB may also file the same type of exemption if they believe the exemption would be permitted to continue operations under the current blanket exemption and CAB grants a denial the new application. The proposed change in 262(j) would generally strengthen the Board's power to deny more effectively both large and small non-scheduled airline operators because the revision eliminates a non-scheduled carrier's ability to negotiate a non-scheduled route or passenger beyond those set forth in the regulation.

Consistent with the proposed changes in 262(j), CAB moved a detailed work plan to the public notice stage and legitimate public review. Non-sked was advised to study examples proposed by the Board to determine whether they are conclusive illegal airline operations.

CAB's latest move seeks to prevent the widespread practice of passing together individual transport operations of two or more carriers to make an overall pattern of regularity. Such mechanisms for such practices—the use of a single ticket agency for several carriers—would be brought under strict CAB scrutiny.

Non-sked will be prohibited by rule from combining its own operations with other lines. Consistent with the 262(j) revision due by Jan. 15 will be considered before CAB takes final action.

Propulsion Future Outlined in Lecture

A long look into the future of aircraft propulsion which revealed potential possibilities toward semi-supersonic aircraft power standards, was provided by engineers by the 1948 Wright Brothers Memorial Lecture in Wash, D. C., last week.

The lecture, sponsored annually by the Institute of the Aeronautical Sciences, was delivered by Alvin Siverman, director of war board and flight research division, NACA Lewis Flight



CAN YOU TELL WHICH IS WHICH?

Two models of Convair's new Navy jet fighter, the FWD, are shown in flight. FWD (foreground) is powered by the Allison J33 jet engine while the FWD 2 (rear) is powered by an imported British Naso engine built by Rolls-Royce. Pratt & Whitney will build the Naso under license for production models. Convair will produce two separate models as designated above since the engines are not interchangeable.

Propulsion Research Laboratory, Cleveland, Ohio.

While separating engine research and development, which gave birth rapidly through the past, jet turbine research and experiments now have a "snapshot" to guide them into the future with increased confidence. At present, there are only two types of jet engines. One is the combination of the complete south engine section composed comprising, combustor, turbine, compressor, and nozzle, and indicated clearly that there engine, with the exception of the compressor type, is only at the beginning of what can be called their development life.

Some of the goals of determined research effort:

- Increased compression ratios to 20 or 30, which are five or six times greater than those present, and can be obtained by use of the use of the supersonic compressor, by recombination of centrifugal and radial-flow compression or turbines.

- Increased turbine inlet temperatures to 2900-3500 deg. F., or double those in present use. This may be possible through the use of liquid air-cooled blades in combination with open heat-shielded turbine blade allies.

- Increased combustion input to the turbine to as high as 10 million Btu/sec. If of combustible volume. This is to allow twice the thrust output of the present combustion. This can be produced in a result of the increased compression outlined above and by preventing the mixing and burning processes within the combustor.

- Improved heat-shielding material must be found to accommodate the temperate ranges mentioned above. The present outlook for metal silicon is gloomy and bright hope for the future appear to be ceramics and composites, ceramics bonded to metal.

USAF Completes Two Nonstop Flights

U. S. Air Force stretched its wings last week, sending a Convair B-36B on a 10,000-mile nonstop flight and a Boeing B-50 on a 9,400-mile nonstop flight. Planned round-trip combat bomb loads.

The B-36 was selected in flight these tests by special modified Boeing B-29 aerial tankers. The B-36B was not involved.

This demonstration of extended flight stage was made as a part of the operational testing program in the two new bomber types by the Strategic Air Command Air Strategy. W. Shultz Strengths said the B-36 aerial refueling operation demonstrated that it is now possible for an aircraft to fly nonstop from one end of the continent to another from the sky deck. At the same time USAF decided that the up-and-coming crews of B-36 long range groups would be equipped with flying tankers for long range operations.

Both bombers flew the 10,000 miles of Hawaii's robust circuit by the island's radio nets.

Top Officials Change At Curtiss-Wright

Curtiss-Wright Corp. has a new president and chairman of its board of directors and executive committee as a result of top executive changes announced last week.

Gov. W. V. Vaughan, new chairman of the board, succeeded in the presidency by William C. Jenkins. Paul Shields has become chairman of the executive committee, a new post. Jenkins, the vice president of Curtis-Wright's subsidiary, Wright Aerocraft Corp.,



and a director of both of the companies. ▶ **Vincent Stino Deurs**—Chairman of the board had been vacant since the death of George A. Deurs, senior member of the Wright brothers' family. Vincenzo was chairman of chairman of the board of Wright Aircraft, Inc., has been president of Curtis Wright since 1955 and president of the subsidiary since 1958. He has been with the two companies 25 years.

Jordan has been vice president and general manager of Wright Aeronautical, and is a former manager of the Curtis Wright Airplane division.

Shields has been a director of Curtis Wright since Nov. 3. He is senior manager of Shelders & Co., New York, private banking firm specializing in financing of industrial and utility companies. He has been associated with its organization since 1957.

The changes were made when directors of Curtis-Wright and Wright Aeronautical met in New York. An memorandum by Curtis-Wright names factors of aircraft, engine and propeller, and they had long been under consideration.

Procurement Rule Adds Allowable Cost Items

The three military services have adopted a new section of the procurement regulations, spelling out types of costs allowable in research and development, supply and material, and construction and other contracts. The new section, No. 15, titled "Costs—Cost Procedure," is issued by Directorate C-3.

For major contracts, it generally allows all or everything contract costs are permissible under service rules, tax and occupancy insurance, ordinary legal charges and reasonably benefit disbursements and charges for depreciation on fully depreciated assets.

Advertising, trade and technical journals also is allowable as research and development, test supply and material cost type contracts.

Beech Model 45: A Military Trainer

Developed from the Bonanza, tandem training craft is aimed mainly at off-shelf U. S. and foreign purchases.

A new Beech tandem-trainer airplane developed for military uses has the fast-place Beechcraft Bonanza business plane, has sonic air first test flight at Wichita and soon will tour the country for demonstrations to military personnel.

Walter D. Beech, president, said the new plane, the Model 45 Vincenzo, while not developed with government money, uses all of the latest Beech specifications.

It is aimed at off-the-shelf purchases by the country's foreign governments.

► **State Flying-High** civilian profile for Beech's first training plane developed for the Bonanza can be used for most components of the new Model 45. It is believed that the company can go rapidly into high volume production of the tandem-seater aircraft.

Plans resemble the last one to come from Beech except for a broader service management, a far more advanced design outside, and a conventional single fin, replacing the central arrangement of the Bonanza Power plant is a Contractual 155.

Beech says design philosophy blends the Model 45 to provide a plane with the strength factor of a primary trainer plus performance factors at a low cost, and also to provide an aircraft which can be operated and maintained at minimum cost.

► **Long-Range 19**—Model 45 is intended to substitute for economy aircraft, has ultimate load limit of 10 tons maximum and ultimate landing load factor of 6.67.

Performance data listed excludes maximum permissible dive speed (estimated 250 mph), top speed (estimated 176 mph at sea level), normal cruising

speed (max) 160 mph at 10,000 ft with 91 percent power, landing speed (max) with flap 56 mph, climb rate (max) 925 ft per minute, ceiling 20,000 ft, fuel consumption 20 gal./hr., range at cruise 634 miles, altitude zero fuel and oil, empty weight 3,000 lb., landing max 30 ft obstacle clearance, and cruise 1000 ft.

Marketing director states the trainer can be delivered in quantities of approximately \$20,000 per unit, or about half the price of any series of comparable performance now available.

Comparison of operating cost of the model 45 Model with that of two-trainer planes widely used in World War II, the North American AT-6 and the Consolidated Vultee BT-13, as quoted by Beech, shows the following savings which result in one of the Model 45 over a first cost period:

► As compared with the BT-13, a savings (approximately) 97,700 gal. fuel and a saving of \$87.90 on engine maintenance.

► As compared with the AT-6 a saving of 150,000 gal. fuel and a saving of \$97.90 over the North American in engine maintenance.

Beech points to advantages of parts parts between Model 45 Model and the Model A35 Bonanza. This gives new training advantage of an increased factory production of spare parts and availability of parts replacement and service at authorized Beechcraft supply and service network around the world.

Von Czerny chief Beech test pilot, reported after his first flight that the plane was very stable dimensionally, lift and longitudinal, and had "per fairmane and characteristics to make it a good trainer."

PRODUCTION



TEMCO Busy On Airlift Overhaul

Dallas plant currently processes 50 C-54s in what amounts to more than \$1 million monthly business.

Cuts for the Berlin airlift route and go on a new schedule of 25 m., 15-m. and 10-m. month at the TEMCO plant at Dallas, Texas.

Working over the C-54, cleaned with red dope on floor dust and otherwise beaten up from the grueling freight runs into the Soviet-blockaded metropolis, the former cargo aircraft at TEMCO's spruced 1,279,500 sq. ft. plant on the western outskirts of Dallas. An unofficial estimate is that it's better than a million dollars a month.

► **Demolition Routine**—Due to Dallas' Gandy Railroad, Westover Field, Dallas, Mass., a C-54 exterminator (cyclic-methanol) routine that will keep it there from close door to face exits before a few new sheet back to Europe with it for its next 1000 hr. at postcleaning.

About one in five of the aircraft will require a complete visual job on the tank, the biggest single overhead job on the C-54. This alone requires some 3000 hours-work of work.

It means cleaning with thermal spray gun, then stripping, then applying top 1600-gallon tank bath which naturally the internal structures of the C-54.

Possibly total rebuilding of floor insulation, "hanging wet" of floor beams, is another major item in the overhaul picture, especially since heavy loading, if not outright exceeding, lifts to the lot of the eight mts. at the hands of men expertly trained to deliver the goods to Berlin in the cold one.

C-54 arrive at TEMCO in a con-

dition C-54 series and bolts, spar loading gear, spar wings, main hydraulic units and the gear R-3000 engine.

► **TEMCO** finds it necessary to make floors, skids, bell frames, and various lifting strings. They make oil bags, gear, exhaust, exhaust panels and parts for repair.

► **Ship Up**—At TEMCO, the C-54 goes down the gang down an overhead lift. An over-haul placed last May at 45 plus planes to be overhauled at a cost of about \$7,900,000 to the present progress of 25 planes a month to continue indefinitely if a cost not disclosed. Actual cost has gone up from last year's monthly rate of 20 planes to 15 in October, to 26 in November. The plant employs 3000 workers, part of the force also working as an aircraft conversion (including a Chinese fighter plane) and miscellaneous products, tractors, track loaders, paper machines.

► **TEMCO** claims it is handling overhaul of all the C-54s being reconstructed for the Air Force, with Lockheed Aircraft Service and Transocean Airlines splitting the balance.

When a C-54 is overhauled, it goes into flight operations at the plant, then to a nearby airport, where it is loaded with cargo and cross-parked. The stop at Westover Field on the outward flight may be only a few hours before they're off to Germany to get the much-needed plane into service again.

Unions Can't Decide On Boeing Workers

Boeing Airplane Co. is running from court appealing to the U. S. Court of Appeals in Washington, D. C., a National Labor Relations Board's ruling that Boeing workers began a strike on Oct. 1, 1958, and that it is illegal.

► **Minor Change Requests**—What the unions call "minor change requests" are also going into the plant. NMU claims 1500 extra equipment for blind flying, three new aircraft, two additional, and minor modifications right now, according to the joint statement.

Worthington controls installation of short-circuited drive belts, change of seats in hydraulic seats, change of fuel, oil and hydraulic lines and tanks in landing gear.

Spare parts are a headache in the overhaul picture. TEMCO finds it necessary to make many in its own shops. Spare items include engine "disposals" (full result), new stock like



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totalization of IAM's 150,000 members. IAM left A. F. of L. in 1946, claiming a 24-year dispute with the Craftsmen Union over installing plant machinery. Reification would take the steers out of the efforts of Dave Beck and his A. F. of L. Trustees to take over by gaining rights for the approximately 16,000 production workers represented by IAM when the strike began April 27.

► **Direct Conflict**—The Trustees set up a new Seattle local, AFW. Workmen and International Workers Union, particularly those who had been won over into a direct jurisdictional conflict with IAM. Beck at that time said his plan at Boeing would change "only if the Aero Mechanics returned to A. F. of L." (AVIATION WEEK, Sept. 22).

The Trustees are going ahead with their engineering work, and A. F. of L. engineer John Swerney signed the job. The Trustees now claim to have almost as many members at Boeing as the Aero Mechanics. When the NLRB decision was still pending, Swerney said he had no objection to effects even if NLRB split the Aero Mechanics. But if IAM signs A. F. of L., the picture might change.

PRODUCTION BRIEFING

Irving Air Chute Co., Buffalo, N.Y., is completing work on a \$135,000 French order for 791 parachutes.

Pratt & Whitney Aircraft division of United Aircraft Corp. reports that it has produced more than 77 percent of all powerplants installed in U.S. commercial transports operated by scheduled domestic airlines.

Mosquidlo Aircraft Co. is moving into new quarters adjacent to the Metropolitan Airport, Van Nuys, Calif. It will take about six months to complete transfer from existing plant of Venetia, Calif. Company plans to increase its employment from about 100 to 400 and expects to add 50 backlog of approximately 125 T-33 aircraft.

Thompson Avionics Test Corp., San Francisco, has started an Air Force research building \$180,000 for testing aerospace items, some of which have been used by the Air Force on the Berlin airlift.

Bryson Mfg. Corp., Pasadena, Calif., has been bought by Alfred H. Payne, president, Payne Mfg. Co. and Barnes Mfg. Co., Marietta, Ohio. Bryson specializes in manufacture of aircraft hydraulic components.

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AVIATION WEEK, December 20, 1948

ENGINEERING

Low-Drag Accented In All-Wing

Configuration slashes parasite resistance to boost performance, but problems of stability and control are not yet fully solved.

By Robert McLarson

The all-wing airplane is a logical evolution of the flying surface. The history of aeronautical science has been largely a 45° struggle to reduce the airplane's parasite drag.

From the original Wright Brothers place of 1903, aerodynamics progressed in the enclosed fuselage, single bay interplane strut arrangement, reduction of the biplane to the high-wing monoplane, introduction of the low-wing monoplane, retractable landing gear, NACA engine cow, full cantilever structure and ultimately the all-wing.

And now here comes the elimination of the tail sections and fuselage, leaving merely the wing.

It would seem that this configuration typifies an evolution of form for safety we can go no further in this direction.

Configurations Details—So the all-wing plane does not represent a new and "radical" type of aircraft from a consideration of form, for it is the configuration for which we have been striving for five decades.

However, since all surfaces have, theoretically, the same component, the principal source of aircraft stability and control, their removal has created a new and interesting aerodynamic problem. It is important, therefore, to bear in mind these two separate and distinct factors

in appraisal of all-wing aircraft: (1) a rapidly increasing in distinguishing between the all-wing and the tailless airplane. (2) use of the latter type have been flown successfully since the time of the Wright Brothers.

Space does not permit even a brief description of the long list of tailless aircraft, but without exception all of these sorts of planes feature one or more severe stability shortcomings in their configuration. The tailless airplane, then, is an aircraft without a "tailplane," as the British call it.

The unique contribution of John Konstantin Northrop to aeronautics is the complete elimination of vertical tail surfaces and the creation of a new aircraft without the wing.

Actually, he has not yet satisfied his ultimate goal of a smooth exterior surface without protrusions of any sort, nor, for Northrop Flying Wing types flows to date have included canards, propeller shrouds, gun barrels and other exterior drag through practical necessity.

A glide version of the Northrop XN-79 fighter housing a power plant closely approached the steel tail support, however, with the original configuration discarding a tail by bringing up the wing leading edge at the center to accommodate the power plant.

Drag Reduction—Since apparently all the all-wing more conventional types in simulation of the parasite drag pro-

duced by fuselage and empennage. Average parasite drag coefficient of several large monoplanes, such as the Boeing B-33, Convair B-24, Douglas C-54, is 0.473, whereas the maximum drag coefficient of several Northrop Flying Wings varies from 0.010 to 0.111, the latter representing the B-35 bomber. Northrop has actually achieved the long-sought "double-d" (0.02) minimum drag coefficient on some designs so model form.

Therefore, the all-wing craft exhibits a minimum drag coefficient more than 50 percent below that of conventional aircraft. It is to the inherent stability of the all-wing aircraft due to that parasite drag of half that is its foremost performance advantage.

Unfortunately, however, this possible "dare" drag is only a part of its total drag, remainder being made up of induced drag of the lift of the wing. But at high speed (low lift), the parasite drag is as high as 85 percent of the total drag, and since the all-wing has only half the average value of parasite drag, it will have only 60 percent as much total drag at the maximum speed.

This means, simply, that the all-wing plane requires 85 percent of the power required by a conventional type to match the same high speed.

Since power required varies in the cube of the velocity, the all-wing will fly



Later Flying Wing A Northrop B-49 jet bomber. Use of four fans compensates for absence of propeller installation.

($L^2/V = 0 = L_{18}$) 18 percent faster than a conventional airplane with the same power.

► Range Improved.—At low speeds, such as landing, which regime is considerably higher than at cruise, the proportion of power to the total drag is substantially less.

Moreover, the range improvement is greater because both air resistance and induced drag are equal. Thus, if parasite drag is 30 percent of the total drag and the all wing drag is 50 percent less parasite drag, then its total drag is only 75 percent that of a conventional airplane at the cruising speed of the latter.

This shows that the all-wing aircraft can cruise at only 75 percent of the power required by the conventional plane at the same speed. Since range varies directly with power required, the all-wing can fly one-third farther (11,750 miles) than the conventional plane with the same amount of fuel.

If the all-wing craft is permitted to cruise at a higher speed in which its low parasite drag contributes a greater percentage of the total drag, then it can fly over 40 percent farther than the conventional plane with the same amount of fuel.

► Structure Efficient.—Because all surfaces and loadings are eliminated from the all-wing, their weight and fuel consumption time are eliminated, resulting in substantial savings in all three factors.

Weight of the framing and fuel consumption are the two largest factors in the cost of the Northrop B-35 which will be 13-16,500 lbs. This is a saving that can be applied to total load as in all-wing type having the same wing loading as the equivalent conventional aircraft.

One of the important indices to airplane "efficiency" is the ratio of useful load to gross weight, which gives the percentage of total weight carried in useful load. Engineers have long held a figure of 10 percent as a goal in streamlining designs and most presently aircraft have a figure of 10-12 percent.

Because of its great wing loading

and total surface weight, the Northrop B-35 empty weight is only about 40 percent of its maximum allowable gross weight, giving a figure of 90 percent use of load.

Again, because loads are carried within the wing itself, the structure can be both lighter and more efficient since more even load-distribution can be achieved throughout the wing area, rather than concentrated largely in the fuselage of a conventional type.

► Flying Wing Stable.—While it is apparent from the previous discussion that the all-wing aircraft possess very superior aerodynamic characteristics over the conventional plane because of its substantial reduction in parasite drag, removal of the tail at the primary source of stability and control creates serious difficulties.

With the Northrop Flying Wing aircraft a maximum lift coefficient of only 1.3, the margin of several large conventional aircraft is 2-3—a 15 percent deficiency for the all-wing type.

At present, the all-wing is attainable only by using a form of a conventional aircraft in some case, must land at 35 percent less weight.

► Low Landing Weight.—This deficiency is experienced only under conditions regarding the use of the maximum lift coefficient, such as high leading and trailing edge camber and so on. With the trailing edge neutral, the all-wing aircraft possesses all of the advantages previously outlined.

It has been customary to provide heavy structural strength in the wing—mainly grain for strength and a maximum allowable loading weight, the latter about 10-12 percent less than the former. Since maximum permissible landing weight is the all-wing is 35 percent less than flight weight, it actually is only about 30 percent worse off than the average conventional heavy aircraft.

To reduce the loss of lift associated with deflection of the wing trailing edge, wing sweepback has been used, and it is this simple change in planform that has caused the majority of the longitudinal stability difficulties of the type.

There are numerous reasons why sweepback is an effective solution to flying-wing problems.

► Advantages of Sweep.—For an aircraft to be longitudinally stable, the center of

gravity must be forward of the wing aerodynamic center since the wing alone has a positive pitching moment.

In placing the engine(s) at this point, a negative pitching moment is created which tends to rotate the wing positive pitching moment.

On most solid sections, the aerodynamic center is located at about the quarter chord point aft of leading edge. With a straight wing, the weight would require that all of the weight be concentrated in the forward 25 percent of the wing, leaving a large part of the rear 75 percent of useless space.

By sweepback, the wing, the same section being chosen, can be shifted rearward any desired amount and the aerodynamic center located forward normally. This configuration then provides additional area forward of the aerodynamic center in which to place the wing load items.

Second advantage of sweepback is that wing tip areas are a substantial distance aft of the aerofoil eg, so that control surfaces placed in these regions possess an effective "tip length," thus load times that distance producing the required trimming moments.

As a result, there can be reduced in size of the tail, and only a minor change in lift on the control surfaces will be required to produce the desired pitch-up moment.

Third advantage is that sweepback permits use of the straight and most cost-effective methods. This has been used in the Northrop Flying Wing. Since the tip shifts at a lower angle of attack than does the aileron aileron of the wing, the aileron in the vicinity of the tip is given a wider base (lower angle of attack) with respect to horizontal surfaces.

The system cannot be used to excess, however, because it makes serious drag when the wing is a whole as it does at high speed (low lift coefficient). Since the inboard portion of the wing will be flying at low or zero angle of attack, the tip aileron will be flying at a negative angle of attack, with attendant high drag.

► Swept-Used—Most serious effect of swept tip trailing edge is that control surfaces located near the trailing edge are at the top of the wing and their effectiveness is lost part when needed most.

A second solution to the problem is use of slats near the leading edge or a slot at the leading edge.

Practically speaking, slots can increase the trailing edge of the tip region as much as 10 deg, but the effectiveness depends on extending them well ahead of the tip (30-50 percent total). Drag of slots and slats in the high-speed con-



Earlier Flying Wing XB-35 bomber showed previously built version of flying craft.



Earlier version of Northrop flying aircraft was this XB-35.

planes with moderate sweepback.

Wing tips at one of the simplest and most effective methods. This has been used in the Northrop Flying Wing. Since the tip shifts at a lower angle of attack than does the aileron aileron of the wing, the aileron in the vicinity of the tip is given a wider base (lower angle of attack) with respect to horizontal surfaces.

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dition has been a major objection but can be overcome by the use of reversible or sealed devices.

The Northrop Flying Wing also uses slots near the tips which are sealed in high-speed conditions and opened for low speed flight.

A third method employs fair plate separators or "cowl" located about the leading edge.

To be effective, these surfaces must extend completely around the wing trailing edge and forward almost to the leading edge.

They prevent迎wind flow of boundary layer in an mechanical fashion by exerting a physical barrier to its movement.

The Northrop B-49 Flying Wing also uses this method, with a separator located on either side of the inboard bulkhead.

Doubtless to one of these surfaces, however, is the tendency to create a very strong region induced by the plates itself.

► C.G. Control—So long as c.g. remains ahead of the aerodynamic center, the all-wing will be structurally stable longitudinally. Location of c.g. is controlled fairly easily in the design stage through proper location of load items.

Peculiar situations must be paid no account of fuel and oil tanks and bomb

body, since weight of those items change during flight. A complete bomb load cannot fit inside more than a minor change in e.g., fuel tanks want to be emptied in prescribed order so that balance is maintained.

Aerodynamic center is not measured so easily, since we're in power, flying, setting and lift coefficient curves shift at this important time.

Power effects an all-wing stability set not seems provided certain basic conditions are satisfied. Effects of thrust on stability is directly proportional to the product of thrust and perpendicular distance from the plane's e.g. to the aerodynamic center.

Hence, the thrust line should pass as close as possible to the aerodynamic center. With constant power, given that conditions are satisfied, the thrust line is nearly as far aft as possible.

► **Gust Stability**—Although the damping in pitch of the all-wing is extremely low (as little as 1/10 that of conventional craft), the free motions in pitch are coupled with motion normal to the chord, and damping of the motions is nearly as great as that provided by the conventional engine feel. These motions are a small of the small radius of gyration in pitch of the swinging type.

This situation also provides the all-wing plane with a definite advantage in gusts. Since e.g. is ahead of the aerodynamic center, the gust reduces the angle of attack and the negative pitching moment tends to alleviate the effect of the gust.

In the case of the Northrop Flying Wing, pilots report that the pitch alteration is actually "too good" and that the large horizontal have a tendency to "rip into" the gust.

The plane comes out of the gust with the nose pointing down, and up again as required to return it to steady level flight, resulting in extra work for the pilot in gusts.

This condition can only be corrected by adding a static margin which would create a new problem since this same low static margin would impair longitudinal stability.

Do Not Thrash—One of the unanticipated difficulties against the all-wing is a supposed tendency to "thrash," a continuous pitching motion about the lateral axis.

Actually, there has not yet been a single substantiated instance of all-wing planes—either actual aircraft or models—thrashing from a flight attitude.

Models have been made to thrash in spin tests by inserting them into the exploding stream in a tumbling attitude, such as turning sideways around the horizontal axis. However, neither actual nor model all-wings have behaved in a stall, spin or other equally violent manner, and a whip still is ideally a maneuver to be attempted by a test or rescue pilot in a 100-ton bomber.

These tumbling characteristics are observed only when a positive static was gain (e.g. ahead of a c.g.) is maintained in the engine. When the e.g. is allowed to coincide with or to pass aft of the engine, the all-wing is stable, providing no instability is introduced and the danger of tumbling becomes very great.

Northrop has proposed that such a negative static margin be provided and the resulting longitudinal instability be compensated by electronic pilots. This damping proposal is made as a solution to the minimum lift problems of the all-wing type, since the location of e.g. off the aerodynamic center would render operation of trailing edge control.

In this condition, the airspeed would drop at a high angle of attack, due to the lack of downwash, and the lift would drop even faster than normal, thereby increasing the camber and rendering the entire wing a high-lift device. An airspeed lift coefficient of 2.0 could be achieved in this manner.

Northrop has actually carried out tests of this system on a conventional airfoil and found that a displacement of e.g. high as 10 percent chord aft of the aerodynamic center did not adversely affect the handling characteristics.

But a dual installation of automatic gauges of shockwave stability would be a necessity for such a system, since failure of one trailing edge pilot would result in loss of control of the plane.

► **Fire Nitro**—One of the unposed all-wing problems in directional stability, the can characteristic which allows flying qualities in the conventional plane to be attained.

Tailless aircraft have, through the years, solved this problem by the location of vertical surfaces somewhere on the airplane.

In the Star quest for the best all-wing aircraft, Northrop has approached quite closely to the job but it is not clear whether a stabilizer that must be located in front of the wing is the answer.

Use of wing sweep provides some longitudinal stability but not enough for satisfactory handling characteristics.

In the B-52 bomber, the propeller does shaft housing and side force of the propeller provided most of the required effective fin area.

In the B-9 jet bomber, absence of the propeller was compensated by use of four fins.

Lack of vertical surface on the all-wing aircraft presents another difficulty in side-slip because it is difficult for pilot to judge when a turn is taking place. The practice is to "feel" for pilot's side-slip meter but this is difficult to do in a tailless aircraft. The side-slip meter may be installed to afford indication to him or to the stick-shaker.

However, this lack of side force is an advantage in the case of asymmetric power since the lack of lateral area per-

mits the increase in drag usually associated with yawed flight.

On the other hand, side force is essential for lateral damping, therefore it becomes an aid for accident prevention. And these considerations may yet make necessary the provision of vertical surfaces either at the tips, along the wingspan or near the center section.

Estimated in the all-wing craft must be kept very small in the interest of lateral control and stability in yaw at 90°. With a sweepback wing, the effective dihedral angle increases with angle of attack, becoming negative at high angles. Thus, a geometric dihedral angle of zero results in an effective angle of 4° or 5° deg. at a high angle of attack.

With this condition, the slightly positive effective dihedral is required, although dynamic stability of the plane demands zero or negative dihedral.

► **Adverse Problem**—Control of the all-wing represents one of its most complex problems because the long moment arm of the tail as a rotational plane at landing and after trailing edge surfaces produce changes in the aerodynamic characteristics of the trailing edge.

Longitudinal control of the all-wing craft through can be gained three ways on the trailing edge is complicated because the airflow separates from upper surface of the wing near the trailing edge, causing "de-flaring" tendencies for the flap.

The problem is further complicated because the slat of an all-wing aircraft must be deflected through a greater range, must operate over a wider range of wing attack angles and, therefore, must be located over a larger range of angles of attack and position.

Several solutions to the problem of effective tailless have been proposed, taking advantage of trailing edge, sealed type with leading edge vent, slots ahead of the slat, automatically controlled tube and spoiler, but none have proved wholly satisfactory.

Then up-flaring tendencies create heavy control loads and, aggravated by long high angles of attack, can actually cause control forces reversal.

For the present, Northrop's solution is the use of variable lift power-driven control surfaces, which hold the elevator surface in place until deflected clockwise.

► **Tailless Slats**—One of the major problems of all-wing aircrafts is control in the approach that it provide enough pitch moment to "control" the nose wheel of the airplane on take-off. The Air Force requires that the elevator shall be strong enough to pull the nose wheel off the ground at 80 percent takeoff speed over a runway with a friction coefficient of 0.10.

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Bendix-Pacific, since 1929, has built over 25,000 aircraft hydraulic service valves of virtually every type. Their experience, in a pencil sketch, is invaluable today for the industry-wide application of reliable, compact, and economical hydraulic valves for aircraft, marine, mobile, and industrial applications. Valves for Army YMO and 3000 RPM systems which are now used, also from Bendix-Pacific.

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**AVIATION
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ENGINEERING

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This factor that is addition to providing enough pitching moment to trim the wing at the lift coefficient corresponding to the ground angle of the airplane, an additional pitching moment is required to replace the nose wheel. At zero lift, the value of the moment at the end of the B-35 is +0.335. Since the total up-right pitching moment of the B-35 is only 0.35, inability to meet this requirement is inherent in the all-wing lift because of the extremely short moment arm available in the elevator control and the small amount of load it develops at low speeds.

► **Elevators.** Used-Northrop has combined the functions of elevator and aileron into a single trailing edge surface termed elevator. This combination makes it easier to deflect a deflection range covering the sum of the wings required separately for elevons and ailerons. For example, when the surfaces are used as elevators to pitch down at low speed and up at high speed, the resulting very large pitching moments are created that may be compensated by only small roll moments because of the shifting of the aerofoil center of pressure.

Northrop solved this problem by the use of a "stop flap," a moving segment of the wing located just forward of the rudder. This is used to supply most of the lift at low speeds, thereby minimizing the upward deflection of the elevons and allowing them to be deflected over a greater range without creating a large roll moment.

► **Webermeier Load-Distribution**

control of the Northrop Flying Wing is distributed by drag rudders located at the tips. These are split flap operating both up and down simultaneously.

Since they operate in regions of turbulent air, effectiveness is low at small deflections. Mounting of these rudders on the tips of the outer center radius deflates to create undesirable rolling moments when the tips flop up during landing.

Accordingly, to prevent the rudders from being exposed to the Flying Wing once normal landing has been completed,

lack of tail surfaces causes the wing to possess extremely low lateral damping characteristics. Consequently, low weathercock stability and high side-force sensitivity develop the all-wing craft susceptible to "Dutch Roll" oscillations.

However, low weathercock stability makes the period of the oscillation too paratively long so that rudder control can be used to effect recovery.

However, if rudder control is weak, the rudder's time of response may be the same as the period of the motion, and the Dutch Roll continues.

► **Fly-By-Lightning.** An absence of landing flaps on all-wing craft has proved one of the most difficult of its design problems. Use of sweepback has minimized the problem, since the flaps may be rotated on the inboard portion

of the wing, as in the Northrop Flying Wing, where the pitching moment is reduced because of the short chord.

The result is a dramatic benefit of the relatively small pitching moment increment accompanying the production of a given lift increment. This effect can be further improved by moving the flap hinge line position forward, since this also moves the centroid of the flap load forward along the wing chord center in the aerofoil center of the wing.

However, proper flap design minimizes, but does not eliminate, the undesirable pitching moment, and this adverse effect is canceled in the all-wing craft as the aerofoil center of gravity forward.

In the B-35 that limit is only 6 percent of the mean aerodynamic chord compared to 10.12 percent in conventional aircraft. While the wings in all-wing aircraft, in general, advantages are minimized by the fact that the aerofoil produces a greater camber sensitivity ratio so that small ratios of lift are comparable.

In addition, load items may be distributed over a comparatively great area apportioned within these limits as compared to the conventional plane.

► **Spiral Stability.** Suddenly spin characteristics of all wings are essentially the same as in conventional craft, contrary to distributed resistance.

However, recovery from the spin is considerably different than with conventional aircraft. The B-35 will continue to spin with the rudders against the spin and the conventional aircraft recovery method of reversing the rudders and then steering the tail forward will not effect recovery on the all-wing aircraft.

Allowing spin recovery is made with elevators used as rudders, so follow-The rudders are kept on the tips, so that the center column must be folded forward and the seat in full bell against the spin.

The sitting is trim instant and will spin only with the rudders with the spin, the rudder with the spin and the seated column is neutral at full back.

► **Developments.** **Mark III.** The all-wing possesses extremely promising advantages over the conventional planar, but these are compensated by several stability and control problems which have, as yet, been only partially solved.

Obviously, the greatest efficiency of the all-wing configuration makes it a superior aircraft when compared to those of conventional configurations and it is these performance advantages that make the extensive research and development required for the full solution of its stability and control problems well worth while.

John K. Northrop has made profound progress in this direction and right full credit is awarded at the present design of all-wing aircraft.



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ENGINEERING

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AVIATION WEEK, December 20, 1946



HOW THICK IS A BUBBLE?

Wendy tagged "Bubblecounter." The device shown developed by General Electric at a cost of Bell Aircraft Corp. to measure thickness of plastic coatings on thin balsa wings. Gage measures electric noise, and operates on resistance principle. Dial indicates distance between small thin block

measuring outside of bubble and respective film and spool loads. The gage measures rate of change of permit related. Coatings less than .0005 in. thick can be measured at 65/1000 and it losses with 75/1000 as target. GE suggests use the measuring device can detect 5 percent variation.

NACA Investigates High-Altitude Gusts

"Clear air turbulence" may become a familiar term in the coming years if present scientific investigations of that disturbing phenomenon produce expected results.

While the persistence of gusts near ground is known at altitudes below 30,000 ft, it is well-known that the roughly turbulent natural occurrence, which often causes gusts in clear air at altitudes above 40,000 ft, has always behaved as "over-the-weather" height.

Although in the past there appear to have been discussions or attempts to represent natural occurrences, ability of past work to operate at altitudes above the instrument layer has increased the frequency of the reception of such reports.

Gust Research.—To provide comprehensive information on the natural occurrences, the National Advisory Committee for Aeronautics has launched a research program utilizing a "parachute" to provide the required information.

This device is an adaptation of the familiar balloon. While the latter transmits direct temperature, density and pressure data, the new apparatus transmits only the accelerations it experiences as it descends slowly from high altitude.

Operational Details.—The parachute is a small box housing an NACA accelerometer which feeds signals into a tiny transmitter. These pulses are imbedded to the ground where they are measured for subsequent analysis.

The apparatus is suspended from a balloons which, upon release, carries the instrument so altitude above 100,000 ft.

As the altitude the low atmospheric pressure allows the balloon to expand and burst. The parachute then falls toward to the ground by parachute at an average rate of 1000 fpm, thereby sparing about 14 hr. for descent.

Obviously, a considerable quantity of data on conditions experienced can be recorded in this period.

Initial Trials.—First experiments with the new device took place last summer at Hansford-Strauss Air Force Base, Calif., under the joint direction of the NACA, Dr. Werner Stettler, and Dr. John R. McCormick, Director of the 4030 Weather Project.

First two trials made over the Mojave Desert, where clear air turbulence has been reported more often than in any other part of the country.

Value of the new program lies in the possible importance of the results leading to the design of high-speed aircraft and missiles intended for operation at these extreme altitudes.

The presence of severe gusts would require a substantial increase in the strength of the craft to carry the additional structural loads imposed.

Captured Wind Tunnel Reaches Mach 5.18

The unique "Kochel" wind tunnel has been placed in operation at the Naval Ordnance Laboratory, White Oak, Md., and has attained Mach 5.18—highest yet reached in an installation of its size—in preliminary tests.

The velocity was attained at a temperature of 537° F. and at the equivalent of 7070 ft. of sea level under standard conditions.

Tunnel History.—The tunnel is no longer in use; it was located near Kochel, Bavaria at the time of capture by Allied soldiers. It was originally built at Peenemünde but was moved to a new site at Kochel to escape Allied bombardment.

It was dismantled, shipped to the U.S. and reassembled by Navy Bureau of Ordnance under the direction of Capt. H. M. Macomber.

The facility actually includes three separate tunnels: one built from a central pumping plant, 10 ft. in dia., space 11.75 ft. by 13.75 in.; the other 8 ft. in space (7 ft. 6 in.) by 7 ft. 6 in.

Pump is supplied by a large 52-ft-dia spherical tank which is emptied to a vacuum by a 300-hp. electric motor driving two rotary vacuum pumps.

Operation.—When the test section of one of the two larger tunnels is ready, a quick-opening trap valve, which valve is opened and the pressure difference between atmospheric pressure at the tunnel entrance and atmosphere downstream of the test section produces the high velocities across the throat.

High-pressure air jets are obtained only between the throat and the exit cone as a supersonic and the sonic pressure approaches steady-state conditions. At maximum Mach number, that time is 39.40 sec, depending on density, pressure and temperature.

The shock wave thus moves forward through the throat and into the entrance to stop the supersonic flow. Response time is about 15 min. The two tunnels are used to permit more rapid adjustment of models and preparation of tests in the tunnel not in use.

In contrast to that short first period, however, the exit trap valve can be opened and closed by the local use of the vacuum pump, although this, of course, restricts the other two tunnels usage.

Performance Improved.—Much of the equipment of the tunnel is new, particularly the inlet, exit and traps, and various other areas of equipment.

Actually, performance of the tunnel has been substantially improved in the rebuilding operation, since in Germany the maximum speed was Mach 4.85, and is presumably around the the V-2.

NEW AVIATION PRODUCTS

New Synchro

New version of Synchrostat, made by Kellgren Instrument Div. of Sprague Div., 55th Ave., Elmhurst, N. Y., is reported to have electrical output as varied 50 percent, with weight and volume decreased to 1/3 of former unit. Used feature is inductive electrical pickup, whenever during flight it is so small that conventional synchro cannot be used. Lightweight rotor makes it useful where very high accelerations and rapid oscillations are to be anticipated. Device is stated as readily adaptable to flight and engine instruments and may be incorporated in case of regular dial and pointer instrument or in electronic indicator. Other features include: no contacts or switches required for automatic power, flight rate recorder inputs, air traffic control controls, landing gear sight computer inputs, landing gear actuating, and an most conventional synchro systems.



D. C. Power Supply

Designed for use with instruments requiring highly stable d.c. voltages, vacuum-regulated power supply made by Hastings Instrument Co., P. O. Box 1275, Hampton, Va., is stated to be suitable to five strain gage, position potentiometers, recording milliamperes, and other laboratory dividers. Output voltage regulation is reported better than 0.1 percent and ripple less than 0.01 percent. Device is adjusted by rheostat for optimum regulation, any specified load of from 10 to 1000 ohms and for output voltage from 1 to 100. Regulated output is obtained within 0.1 second for input line voltage varying from 75 to 135 v. at frequencies from 50 to 400 cps. Unit measures 6 x 5 x 6 in. and weighs 6 lb.

Strain Rate Pacer

Operating in conjunction with company's testing machines, such type strain and pressure gauges are made by Baldwin Laboratories Works, Phila. 42. Pt. Feature is reported to be more accurate and direct indication of displacement rate between test specimen page 5000 as compared with page one of range of testing machine provided. Transistor unit is mounted in company's autographic recorder and controlled by rheostatized dc power. Indicator unit, in usual caliper, is connected to recorder by extension cable with pulse plug. Electrical elements of indicator are dotted dots, excited by synchronous motor at predetermined speeds, and contact points rotated by a synchronous motor under control of self-synchronous generator and in recorder, at rate pro-



Mechanic Aid

New heavy-duty torque bar, made by Richman, Inc., 2810 East 11 St., Los Angeles 23, Calif., is stated to be 1000 lb.-in. capacity in range from 200 to 800 lb.-in. Design is reported for specific requirement and will deliver torque to machined lead "chuck" in board and simultaneously, send button or handle tape

operator's hand, thus giving both "lead" and "chuck" signals. Bar is rotatable with or without detachable head or with special heads built to specifications. Standard chrome steel head is a removable 1-in. square drive nut type. Threaded rod is standard steel. Simple adjustment varies torque setting.

For Aluminum Welding

New welding process, known as "Aero-concrete," may be used for welding heavy sections of aluminum and stainless steel alloy at a high feed rate ranging from 100 to 300 in. per min., and is claimed to permit deposit rates exceeding those attained by arc welding. Developed by Aerowelds, Inc., 1000 Madison Ave., E. 46th St., New York 17, N. Y., consists of heating electrodes wire through a specially coated welding "cage" with carbon arc welding electrode shielded from arc by inert gas. Full metal cored welding current and arc is maintained between end of wire and work. Power is supplied from standard d.c. welding generator. Gun is equipped with trigger start and jog button for feeding wire when not welding. To start welding, trigger is depressed. It can be forced on "on" position by button. The start of shielding gas electrode is switched on the work, and when wire is voltage is established, switch opens to engage feed motor and deliver filler metal.



Close-Tolerance Welder

Hydraulically operated sheet welder, Type HAR, completely automatic except for loading and unloading is announced by Agnew Electrode Co., Melrose, Mass. Whole hydraulic pump supplies pressure to articulate main platen and hold valve controls that cycle, or it can be clamping. Dies are replaceable inserts which eliminate cost and save practical broad application of work. Tap switch on transformer provides wide range for diversified production. Width of engaged platen is 10 in. and electrode type tungsten and electron gun all necessary accessories. Unit is claimed to be particularly designed to give uniformly of welds and close tolerances.



Troubles of French Air Force

Obsolete aircraft, dollar and sterling shortage, trainer lack and low pay are major problems.

By Boyd Foster

PARIS—The flight of the French Air Force today clearly highlights the difficulties of Western Europe.

Here's what the French Air Force now has in planes, men, and organization:

Planes are worn out and obsolete. Biplane has agreed to loan France 15 Vought jets and some new transports. But they have not arrived. French pilots still fly 1944 Spitfires, Magisters, Mustangs, and Thunderbolts.

Strength—Total strength of the French air force is about 10,000, of which roughly 1500 are considered combat-ready. But most would have landed in the same bad shape in either the U.S. or Britain.

"Cheatos" planes account for about 200 of the total number, transports for 700, bombers for the rugged equator, trucks 900, miscellaneous boats even for the rest.

Organizationally the fleet is divided into 15 combat squadrons, eight training squadrons, one heavier squadron (in colonial) and transport squadrons.

The Post French Air Division based in Germany is at the heart of the French combat force. It is equipped with the best fighters in the fleet—mostly 1945 Spitfire and Thunderbolt, including a dozen Gloster Meteor jet fighters. The rest of France's fighters are scattered, though concentrated in Indochina, over海报 in North Africa, a few in Magindien.

Bombers Magister—Bombers have been practically out of the French Air Force's budget. At the end of the war France was spending four bomber squadrons. Now it has only one. Hispano four-engine squadrons based at Bourges and converted to transport duty. French airmen generally agree that bombers represent a futile expense right now. They reason that France would be lucky to find itself in a war again in a future war, though it is not yet clear the offensive.

The French Air Force's budget has turned in an impressive record of hard flying over the last dangerous years of the French Empire. Last year it hauled 130,000 passengers (90 percent of Air France's initial) while only 100 civilian

planes were in the past two years. Largest group of applicants for air schools consists of naval academy rejects.

Facilities for training aviators—planes, instructors, classrooms and so forth still exist. The radio school at Aosta and the mechanics school at Rochedot offer training comparable to that of the U.S. or Britain.

But flight training in French Air Force schools is badly crippled by the general plane shortage. The Air Force has 900 transports—mainly British, given to the French at the end of the war. More than 50 percent of these are kept flying day and night. One by one they are wearing out. No replacements are in sight.

The French 150 Squadron thinks only in being trained in 12th. But training is not enough. Theoretically they have six days in which to train.

Reasons for the falling off in Air Force recruitment are simple:

► Low Pay—Air Force salaries are markedly low compared to U.S. or British standards. A French second lieutenant receives a maximum of 175,000 francs per year (roughly \$575 at the old rate of exchange). His maximum salary is 240,000 francs per year (\$835). He may earn 175,500 francs flight pay per year (\$445).

While these are the low total salaries to officers in the refresher which has no relation to the amount of flight pay to lower pay. Second lieutenants in 1944 were paid 278 francs a month plus 218 francs flight pay. This ratio was maintained with some gap and down between wars. Now this 18 percent who of flight pay to base pay has dropped to roughly 11 percent. The principal and payroll section of Air Force officers within the armed forces has dropped with it.

► Personnel Shortage—Volunteers also discouraged by the fact that chances are small to get into the Army. As the time of the Liberation ranks of the efficient corps have diminished and largely passed of a high percentage of officers who had remained local in Paris.

Their pits were filled with young married military leaders many of whom were as incompetent as they were patriotic. Positions in the field were made more often on a basis of glibly rather than leadership.

The result is that France has one of the world's youngest and most undisciplined air forces. This cuts down both the rate of recruitment and retention. As a result to maintain this Air Force unit costs up to 20 percent more than it did to fly five biplane things when a similar cost look forward not only to dive bombers. Even if it reaches the higher peak he knows he will be forced to retire too early to live on his pension and too late to start a new career.

► Personnel Men of the squared away, though hard to find as planes. French industry only one percent of the former French Polytechnique—already a difficult breeding ground for air crews. And though it is good for the Air Force.

Both the caliber of new air force volunteers and training facilities have de-

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where Berlin rules high marshalling on gates and keep well in check on their bases. Because of the CAA's radio linking system, flight will not fail; a child will not go hungry nor cold! This Christmas, Gilfillan departs in its part in CAA.



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AVIATION WEEK, December 20, 1948

SALES & SERVICE



Typical of company-owned plane at the Goodrich Barn.

Spokesman for the Business Plane

To aid its 30 member companies, Corporate Aircraft Owners Assn. watches legislation, swaps information.

Business planes are playing an increasingly important role in the operations of many companies whose products range anywhere from oil to bacon.

Once for the exclusive use of big executives, they are gradually being used in sales and production work.

Growing dependence on these planes has created among the companies that own them a demand for a large voice in the legislation that affects their use. And the CAA, despite repeated attempts to make available a single agency to serve these worthy flyers.

Our organization, set up to tackle these problems, is the Corporation Aircraft Owners Assn., Inc., 444 Madison Ave., New York City.

Founded in 1946, CAA now has a membership of 30 planning associations—only three of which are directly connected with the aviation business. This group owns a total of around 180 planes, used for company purposes.

Personnel: President—Peter J. Keane was born Aug. 11, 1904, Washington. Although there are less than 10 members at that time, more than 100 plane owning corporations attended.

Officers of CAA represent some of the nation's largest enterprises—Republic Steel Corp., Standard Refining Co., B. F. Goodrich Co., Bangor Myron Co., Anacrusis and Rolling Mill Co., Hayes Brothers Co., and Chapman Paper & Fibre Co.

Managing in setting up the organization was W. M. Bickel, attorney for Republic Steel Corp., and CAA chairman. It runs as explained by Bickel:

- In general, "dismantling" legislation, regulations and decisions emanating from federal, state or even local agencies, so that interests of plane owning corporations will not be affected.

- To promote a mechanism of exchange of information through a monthly bulletin, meetings and other activities that will bring members in closer contact.

- To enable corporation aircraft owners to be represented in a united front in all matters where organized action is desirable and necessary.

- To bring about improvements in aircraft, equipment and services through joint, cooperative action among owners who will meet in constructive suggestion to manufacturers, distributors and service agencies.

- To help the cause of safety and economy in the operation of aircraft by the association and distribution of information.

- Technical Committee—An impartial CAA service is the technical committee composed of their veteran pilots and headed by Walter C. Fagan, pilot for Anacrusis Steel Co. The tech committee

works on problems of conserving fuel, models sets the types of planes needed by members.

In this capacity, they will be able to advise airplane manufacturers on plane-making improvements requirements. The result is that manufacturers will know more fully than they have in the past how to fit the needs of these people.

The committee also evaluates units planes and makes recommendations. In addition, it makes preparations before an election of officers though it doesn't recommend any special name before.

Most places owned by CAA members are in Berlin and Germany.

Another service is the pilot pool, from which the members may obtain data on various pilots looking for positions.

CAA also helps CAA by serving as a point of contact for information from plane-manufacturing competitors.

■ **Promotion.** Secretary—Until now CAA has been more or less loosely organized and no real effort has been made to bring in new members. To expand this situation, it recently appointed a utilization committee. Its major goal will be to coordinate activities and initiate a full-fledged membership drive.

Secretary is G. B. Colby, former editor of *Air Week* and a pilot.

Colby points out that "our 1800 companies are eligible for membership in CAA." He explains that "we are aimed primarily at helping the small manufacturer who owns airplanes. We don't want to have an exclusive cut out."

Colby feels that members' planes would get better service if marked by a CAA insignia. Airport personnel knowing they were on business would be more likely to give them priority over commercial planes.

■ **1949 Corporation Planes.** He estimates the firms are 200 single and multi-engine propeller aircraft, over 2000 of these, multi-engine "Austrian American Old Gold" alone over 10, one a C-54.

Colby indicated that aircraft owners should start their plans now to marking trade world business planes. He feels the possibilities of this field have never been fully explored.

Plane owners' organizations "are not looking for a 'Volks' job," and will pay the price if it's worth while.

Membership in CAA falls into three classifications: full members—plane owners corporations and individuals; corporate members—airline members—corporations in air transport; association members, honorary members (ups—intended to persons) who have made a noteworthy contribution to aviation.

Only full members have voting power. Membership fee, including that for associate members, is \$100 annually.

SALES & SERVICE

AVIATION WEEK, December 20, 1948



PRELIM TO SURVIVAL

Forty-five years ago at Kitty Hawk, Orville Wright soared aloft to make mankind's first down-of-hand flight—an accomplishment that despite a complete belief that this scientific achievement heralded an era of continuing friendship among the peoples of the earth... now has shown that in countless details the engine can be a frightful instrument of aggression. Only three years after World War II... and just a year after the Air Force has commenced its first campaign of electronic warfare... there is abundant evidence that man's sense of a dominant American air power is a vital factor in discouraging aggression. Republic joins with the USAF in committing our finite resources to this end.



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AVIATION WEEK, December 26, 1948

TRANSPORT

Domestic Freight Traffic

| | (Ton Miles) | Fleet Nov. Month | Fleet Year |
|---------------|-------------------|-------------------|------------|
| Camer | 1948 | 1947 | |
| Silk | 18,945,000 | 21,877,000 | |
| American | 14,959,000 | 14,839,000 | |
| United | 14,802,000 | 16,081,000 | |
| Flying Tigers | 9,000,000 | 5,600,000 | |
| TWA | 6,773,000 | 4,520,000 | |
| C. & Western* | 4,911,000 | 11,116,000 | |
| Walla | 3,786,000 | 3,229,000 | |
| U. S.** | 145,000 | 1,371,000 | |
| Total | 78,882,000 | 72,218,000 | |

*Cathay Eastern suspended freight operations in May, 1945.

**U. S. reactivated freight operations in Nov., 1946.

Another Record for U. S. Freight

Survey indicates heavy increase over 1947 ton mile level; scheduled carriers account for most of gain.

By Charles Adams

U. S. air freight traffic is marching toward another record third year, but the independent operators who set the industry pace in 1946 and 1947 are beginning to lose ground to their certificate rivals.

An industry-wide survey indicates that freight handled by 10 domestic air carriers in 1948 will be at least 25 per cent above the 100,000,000 ton mile level of 1947. The 16 certificate domestic franchises will account for nearly all the industry-wide gains, with the 10 independents boasting their biggest year.

► **Traffic Shifts.** Eighteen carriers are listed and eight certificate—which flew 22,750,000 ton miles all last year (over 70 percent of the industry total)—accounted for 70,062,000 ton miles during the first nine months of 1948. But the independents, which flew more than 50 percent of the eighteen 1947 volume, handled less than half of the tonnage in the first three quarters of 1948.

The uncertificate carriers—Sikorsky, the Flying Tiger Line, California Eastern Airlines, Wallis Air Service and U.S. Airlines—are the five independents that have been recommended for certification by Civil Aeronautics Board reviewers.

► **Prediction.** Two Optimists—Industry analysts forecasted the CAA early this year, both certificate and uncertificate

groups in the air freight industry probably would surpass their traffic more than 100 percent during 1948. But of the eight major carriers tracked, only the Flying Tiger Line saw more than double its 1947 volume.

Sikorsky, America's largest domestic freight carrier in 1946 and 1947, almost certainly will take top honors again this year. The Sikorsky company flew 21,160,000 ton miles in 1946, 21,915,000 ton miles in 1947 and 33,945,000 ton miles in the first nine months of 1948.

► **Challenge to Sikorsky.** American Airlines' current charge lists Sikorsky and, as of September and October of this year, became the first carrier to fly more freight than the independent over a projected period. American accounted for 7,211,000 ton miles in September, and living up to a new company record of 2,974,000 ton miles in October. Sikorsky, flying 2,715,000 ton miles in September and 2,311,000 December, will below its all-time peak of 3,000,000 ton miles next May.

Ralph S. Turner, AA president, and his associates will hope their company's freight volume will continue to grow despite intense competition.

"We are forced to hold our freight expansion plans somewhat in abeyance until DC-4 deliveries promised us in January 1949 come from passenger service, and fit them for cargo," Turner stated. "But now we have the planes to back up our objectives we are going the best

freight service in the world." America, which currently operates 14 DC-4 Air freighters, in addition to combination passenger-cargo ships, last month marked its fourth anniversary of all-cargo service.

Douglas said that in spite of America's lower freight volume during the past two years it has consistently incurred a higher rate of revenue return than all other certificate carriers. "In 1947, for example, American realized \$4 million in freight revenues compared with \$2.7 million for the largest uncertificate carrier even though their volume substantially exceeded ours."

This is not to say that our specific freight interests indicate a comparable margin of profit over our competitors. Our favorable rate of return is due to the fact that we provide freight service on a common carrier basis to all the cities we serve, either than just in the industrial centers. This involves the handling of small, small shipments on short flights with low volume—absolutely ideal conditions for short distances.

► **Profit for Sikorsky.** In the third quarter, Sikorsky reported that it expects to show an overall profit for 1948 and plans to expand its operations quickly. It is given a certificate from CAB. Lewis J. Morrison, Jr., Sikorsky's executive vice president, said that the company's air freight operations together with mail freight work on C-46s for the Air Force, produced a composite profit of \$11,300 in the third quarter of the year.

He added that if the CAB certificate is forthcoming, Sikorsky would need perhaps \$1.5 million additional capital. This money, Morrison declared could be provided by CAB partners in efforts to eliminate unfair competitive practices and price practices in the freight industry.

► **Mailification.** Work-Sikorsky's supply and service division, which is handling C-46 modifications for the Air Force and other customers, helps provide the company with needed income, according to Morrison. "This trend arose because of unfair competitive conditions faced in the industry by the uncertificate passenger airlines, which consequently attempted to establish rates below Sikorsky's costs, which are the lowest in the field. We have effectively lowered our rates below costs in some instances to meet those of other carriers, although we do not know exactly how far we are going to go in this regard."

During the third quarter of 1948, Sikorsky reported \$931,250 operating costs from mailcarrying (based on 1.65 cents a ton-mile), plus \$34,926 from pickup and delivery, \$694 from other sources and \$156,182 from the supply and service division. Without the supply and service division's income, Sikorsky would have shown a sizable deficit.



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throughout the first nine months of 1948.

On the basis of freight tonnage alone, Stick had shown profits in early last month (September and October, 1947) since starting operations in March, 1946. The carrier's overall debts from the time the company was formed until Sept. 30, 1948, were \$1,590.

► **Tenants Two**—G-60s on Hand—Stick's fleet consists of six G-60s, four of which cost \$44,500 each; the C-46Fs (in gross cost \$24,000 to \$25,000 each) and a C-46A which is not being utilized. In addition, the company is letting 10 C-46Fs from the Air Force at \$300 a

month. On Sept. 15, Stick had 612 employees in its freight operation, including 96 flight personnel, plus 180 men placed in the supply and service division.

Late Sept., the Flying Tigers, California Eastern and Wilts are negotiating their freight contracts with other airways.

Cuban Eastern filed bankruptcy action last May 12 but has been leasing its C-54s to non-audited operators since then.

► **U.S. Airlines**, which engaged freight service last May, has discontinued operations for six months, due \$733,167 in back freight charges, bringing its total debt to \$218,489.

Traffic Upsurge Seen for 1949

UAL President W. A. Patterson says prospects are good, but improvement in earning picture depends on CAB.

United Air Lines President W. A. Patterson believes that the transport industry has good prospects for a traffic upturn during 1948, but cautions that any improvement in the dismal earnings picture of 1947-1948 depends entirely on the Civil Aeronautics Board.

In a personal review, Patterson said that even though airfares travel may continue to decrease, his company ex-

pects at least to equal in 1948 the volume of about 2,800,000 passengers recorded in 1946. At most, he declared, should there some increase as a result of a rate reduction of five percent or just some start in last September.

► **1948 Traffic Estimated**—During 1948, United flew about 1,295,750,000 passenger miles, down about 3 percent from the 1947 figure. Total volume this year totaled approximately 19,271,000 air miles, up 7 percent over 1947, against last colleague was about 7,739,000, up 5 percent, while freight traffic stayed at 20,088,000 ton miles, a gain of almost 100 percent.

Rejection of the comparatively high traffic enroute, United believes partly to be caused by what it deems to be lack of interest on the part of CAB to correct the situation so transportation others and to ignore other problems facing the industry.

Patterson said that costs continue to rise ahead of rate increases in the air transport industry. Since 1941, United's wage expense has gone 57 percent and materials 50 percent," he declared. "Recently, the company's best men have been offered only 34 percent, while fuel pay and expenses have both dropped 45 percent. Today, only 7 percent of United's revenue comes from air mail at against 95 percent in 1929.

In 1948, United flew, as estimated 27,342,000 revenue place miles—about 90 percent of its scheduled mileage for the year—and about 70 percent of all flights were completed within 15 minutes of scheduled time. In 1947, the company completed 27,775,400 revenue place miles, or 94 percent of its scheduled mileage, but only 30 percent was completed within 15 minutes of scheduled time.

► **CAB Position**—Executive Vice President W. A. Patterson said that the Commission has agreed to make the following changes:

- CAB to re-examine rates
- Increase fuel
- Light weight
- One 12-month audit
- Any plane



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compared with 56.5 in August. By contrast, United Air Lines, which did not institute a daily bus plan until November last, reported its domestic load factor decreased from 8.8 percent in August to 64.36 percent in December.

■ **Long Distance.** Profitable much of American's transcontinental traffic (predominantly westbound) the same month of 1947 can be attributed to traffic generated by the heavy load it still the subject of airtime economy and CAA rules. But AA continues slow without qualification that this will not affect with the plane's revenue-producing results.

Average family group taking advantage of American's first of the week special fare to about 2.3 persons. Fare payment of the half-fare passengers are first class, so one third out of every bus fare passengers using the double decker.

■ **Traffic Increased.** Under its original tariff, American's family fares would have expired Dec. 31. The carrier recently asked CAB to extend the plan until March 31. Other "bus fare" carriers are asking the same extension.

Airline Group Sues N. Y. Port Authority

The dairy awaiting load before the airlines and the Port of New York Authority came to a legal halt work in an equity suit filed in New York State Supreme Court.

Eight airlines charged that the Port Authority had "unlawfully, illegally and without justification imposed breached and violated the airlines' letter of license."

They demanded the Authority for welfare and equity ceased its illegal and unfair practices and directed whether in a business approximation it is "legally and morally bound to honor contracts entered into and and binding."

Suit is for judgment directing the Authority to honor lease which the airline contracted with the City of New York in 1945. The airlines say the Authority before taking over the port, agreed to recognize the leases.

■ **Interest from Sohio.** In raising the Port Authority's "body corporate and political definition," the airlines do not attach that organization claim to causality from not. They do however defend themselves two executives and that Authority's most pressing concern. The executives are Austin C. Tolson, executive director, and James C. Bradley, director of airport development.

Outcome of the trial, probably one to get the airlines into Medicaid under terms of their charter contracts will have far-reaching effects. Success of the airline action would be a double

blow to the Port Authority, partly because it would be precluded from using the port's facilities but mostly because its claim of causality from not would no longer stand.

■ **Colonial Nat. Included.** If the Authority can be sued over Medicaid, its other out cases will be vulnerable to similar actions. The Authority declared official comment immediately after the suit was filed, although a spokesman expressed belief it could not legally be sued.

Colonial Airlines, after participating with the other carriers in a protest against the authority's decision to cut off the planes as the current action Colonial doesn't want to court the same fate. LaGuardia Field because of increased traffic difficulties and higher costs. But it supports the others in their basic contention with the port agency.

SHORTLINES

■ **Alaska Airlines-CAB.** has appealed the carrier's application for a \$232,000 loan from the Reconstruction Finance Corp.

■ **Americana.** Is planning winter travel with an informative folder pointing to its safety and dependability since its time. November will feature dinner and the gala drawings. The folder is aimed at people "who would sit down with us and say 'why would we ever go with you by air during winter'" and state that "safely, service, have nothing to do with safety."

■ **BOME.** See Miles Thomas, deputy chairman, stated in his well selected with the organization's western division situated in North America following a recent inspection tour.

■ **Delta.** Is turning 16 men with cockpit qualifications to take on flight crew duty on its five new DC-3s.

■ **National.** Has raised its fare to the same level as those of competing carriers (Pan Am and Delta). Prior to implement at the pilot strike, NAM president G. T. Baker said he would not lift basic fares 10 percent despite CAB's recommendations last August. The new higher fares proposed for a 5 percent increase on nonstop flights. A CAB committee recommended approval of a Capital Airplane equipment interchange fee for services between Capital's ports east of Pittsburgh and north of Washington, D.C. He said the rates change in operation in capital cities west of Pittsburgh would not be in the public interest.

■ **Northwest-L.** L. Sloan has been named assistant director of sales

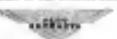
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► For American-His takes delivery as its 2nd and last Convair 580. Convair also will export three to Europe via Pan American's South American Services. Constellation flights are to be inaugurated Dec. 30.

► Robinson—His announced an agreement whereby American Airlines has agreed to charter, charter, charter, charter and leaseback the five jets of Bell-Ito, Rochester, Niagara Falls, Illinois Caving and New York.

► Scandinavian Airlines—Plans to fly a DC-8 load of freight from Copenhagen to Australia this month.

► United—Is continuing its practice of leasing traffic, reservations and passenger service personnel to Eastern Air Lines during winter months. Forty-five UAL employees have been assigned to EAL, and 40 more will follow. In the spring, Eastern leases personnel to United.

► Within Air Service—Reports its recent transatlantic contract at Telecommunications International, London. An Economic Award, regular rates using C-46s.

► Wisconsin Central—M. J. Burns has become sales manager. The leader has long been a user of two-way very high frequency radio equipment over its entire system.

CAB SCHEDULE

Dec. 10—Final equipment in Capital-Shield midwinter Interlineage 1960 (Doubtless 2210)

Dec. 11—Debut of TWA extra communication system, London (Doubtless 1010)

Dec. 12—Final equipment in Capital-Shield midwinter Interlineage 1960 (Doubtless 4110)

Dec. 13—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 14—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 15—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 16—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 17—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 18—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 19—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 20—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 21—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 22—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 23—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 24—Debut on TWA's extra communication system, London (Doubtless 1010)

Dec. 25—Debut on TWA's extra communication system, London (Doubtless 1010)

LETTERS

Propeller Power Plants

Your Aviation Week page Oct. 25, "Propeller Craft Show," presents an interesting article of a very important and controversial subject. However, since most of your comments are directed to the use of propellers in aircraft, I would like to bring a number of points regarding propeller power plants which will be helpful to Aviation Week readers.

1. Your article states that "the total prop engine power 480 mph in piston aircraft goes down as the aircraft speed increases." For the reciprocating propeller aircraft, this is true. The aircraft's weight is given as 40 percent of total weight for the development of total output and specific fuel consumption at speeds of 400 to 150 mph. But consider that specific fuel consumption is based on total weight per hour at 200 mph. This is calculated as a means of finding a typical value for the propeller torque engine is about .7 lb. of pull per .06 lb. of thrust per hour at 800 mph at 15,000 ft. which compares to 1.1 to 1.4 for turboprop engines.

2. The article further states that "high altitude characteristics are not comparable to its low level." Some reflection on maximum power available at altitude is characteristic of the pulsation type of engine, whether propeller or jet, but the very important characteristic of

specific fuel consumption improves with altitude.

3. Your article states, at least strongly enough, that the place of compound propeller aircraft at speeds of 200 mph increases as pure uncamouflaged piston engine aircraft decrease. This is true, but it is not the only factor. There are two other possibilities which will be even more important in the future.

4. Propeller aircraft have the advantages of (1) reverse thrust for landing, (2) air braking, (3) signs up itself in dealing with weather conditions and (4) the ability of propellers with regard to causing propeller stall.

5. Your article places the emphasis on the need for turboprop aircraft to have a higher engine rating at 500 mph. This is correct, contrary to fact in the turboprop powered because particularly useful in the 800-125 mph, and probably higher, category.

6. The article is informed later that "propellers have much lower torque than turboprop powerplants weigh in much as the engine itself," over propellers between .02 and .03 lb. per hp at take off, while horsepower is from one-third to one-half the engine weight available.

7. The article states that "the propeller torque engine is about 150 mph will be at least one-third less than the turboprop at 15,000 ft. The current bill of cost domestic aircraft is about \$70 million per unit with reciprocating engine-propeller power. With higher cruising speeds regardless of the type

of power plant the fuel requirements will be still higher and reciprocating propellers work at higher altitudes if it is given that the annual cost of the latter is \$15 million.

8. Another point in your article that the use of turboprop aircraft instead of propellers at 100 mph is shown. Since the article had previously listed the propellers at 100 mph or less, that leaves the field between 100 and 150 mph at a ratio of nearly two to one which possibility will not be easily overlooked.

9. Propeller aircraft have the advantages of (1) reverse thrust for landing, (2) air braking, (3) signs up itself in dealing with weather conditions and (4) the ability of propellers with regard to causing propeller stall.

10. The article is informed later that "propellers have much lower torque than turboprop powerplants weigh in much as the engine itself," over propellers between .02 and .03 lb. per hp at take off, while horsepower is from one-third to one-half the engine weight available.

11. The article states that "propellers have much higher speed but such moderate range for maximum range, however, a propeller engine is unsatisfactory." The turboprop powerplant is the best type and which is often better speed and range. The propeller aircraft is not particularly satisfying this type of propeller which may be caused on so that we will have an efficient long range air force.

George M. Baier, Chief Engineer
Piper Aircraft
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RUGGED AIRLINE OF THE EAST—Lochhead's Red Holloway sends us the first report of an airline trip we ever saw. He thinks it's worth naming here even if Blase Malouf did write it first for the McNaughton syndicate. We agree. Here goes Henry:

Our readers only started with the entry permit. Cradled in the foothills of the Himalayas, Srinagar is 480 miles from New Delhi, and is served by one of the youngest airlines in the world, one that must be some of the world's oldest planes.

I am sure that Orville or Wilbur Wright would have thought twice before heading the car to Srinagar had he known that at one stage of the journey, the average air pressure 10,000 ft. above Paro, gradually buts falls to standard earth level at the time of year, blinding most of the face by a combination of sun, fog and clouds.

Having traveled the last two months in leathered Pan American Constellation manned by crews with years of experience behind them, it was with some relief that we headed for Srinagar. The sight of the crew was not令人驚异; the cockpit was a turban but no shoes. The pilot sported a beard, a tight fitting white shirt that reached below his knees and sandals.

The weather was awful when we waddled out to the plane, but the young man who collected the tickets made us feel much better when he said to us, "All we have to pay is that you get sick."

The third concluding experience came when after all passengers were loaded, and the door had been locked, it was discovered that one of us Indians had died. The door was opened and the steward bent off to find one. He returned with a gesticulating young Indian who told the pilot he was an infantryman. The pilot asked for his passes. The steward and he began to search him room to New Delhi and that it would take him an hour to get them. They argued for a full 20 minutes with the alleged hero expertly saying, "Don't I look like a soldier?"

Finally, the pilot took his word, the "heroism" jumped in, scoured funeral, put on his head, and we were off.

After we had landed in the 15 minutes the NO SMOKING sign still showed and I asked the steward why passengers weren't allowed a cigarette. His answer was as follows: "A kick in the knee."

"Why, one little spark in here and the plane will burn up like powder," Redd Poof?

After nearly two hours of flying we landed at Amritsar. I got. We stayed there hours writing a weather report on the past. I asked the pilot if the plane really was as dangerous as everyone said it was. He made my heart leap with joy by saying it was even worse than it was said to be.

"Well I'll tell you what a mate." Very narrow. But with one misnomer and we could have had it.

As we entered the Srinagar airport I noticed the flag piled strip, but we landed in a green field. I asked the steward why we didn't use the strip.

"That's for the military. They won't let us in. So we don't fly well enough and will rain it."

Strange to say, the last never has had an accident.

WIND BAG PILOTS—Our quizzed, spook seriously about American balloon pilots returning to hang in the air. A reader urging himself M.T.V., at the Wichita Club, Wichita, Kan., points out that National Aerostatic Airline should be able, in the U. S. representatives of the Federation Aerostatic Internationale to make available a list of U. S. holders of FAI balloon pilot certificates. M.T.V. says that we, indeed, "should knock out balloons as quickly" in that country.

The Karpikes, Goodrich Aerospace Corp., agents in our selling the vehicles "wind bags." They are amateurish known as "the blooming receptacles." This and "This one," he adds, "won't need to be helpful, but merely to show you the column gets solid..."

BITS ABOUT PEOPLE—General, meet Sam Solomon who in New York last week grousing over quick success of Pan Am and Capital as much as expenses. Sam spent well over \$100,000 trying to establish Atlantic Airlines, an all-weather low-cost carrier, but CAB said it was impractical and wouldn't work... Robert Less, aviation old timer, former with the Maritime Commission and later one of the executive staff of TWA, will be welcomed back to the U. S. very soon after a stay as Gen. Clay's economic advisory corps in Germany... Helen Haas, formerly a chief of women's activities for the ATA, is now public relations director of the Palace Hotel in San Francisco.

WHAT'S NEW

New Books

"ASTM Standards on Petroleum Products and Lubricants," prepared by ASTM Committee D-2, details methods of testing, specifications, definitions, charts and tables. Published by the American Society for Testing Materials, 1966 Rate St., Philadelphia 3, Pa. Price \$5.

"Rocket Development," liquid-fuel rocket research from 1939-1941, by Robert H. Goddard. Published by Prentice Hall, Inc., 70 Fifth Ave., New York 11, N. Y. Price \$10.50.

"Young People's Book of Jet Propulsion," by Fred K. Rich Jr., discusses the principles and development of jet aircraft. Published by Robert M. McMillan & Co., 230 E. 37 St., New York 16, N. Y. Price \$3.75.

"With An Aviator," an interesting 75-page photographic history of the "Fifth" in peace and war. Available from the Directorate of Public Relations, Department of the Air Force, Washington, D. C.

Trade Literature

"Catalog of Academy of Astronautics," a 12-page educational booklet on the Academy of Astronautics, Inc., affiliated with Caen Jones School of Astronautics, LaGuardia Field, N. Y. Available upon request.

"The Sharpen Story," a 12-page booklet giving a brief account of the origin and development of the L. S. Sharpen Co., Atkis, Miss. Available upon request.

"The Novar Helium Cartridge Ball Bearing," a 24-page booklet, illustrated. Available upon request to Novar Helium Bearings Corp., Stamford, Conn.

"Cincinnati Power Brakes," a 72-page illustrated booklet covering company's complete line of power brakes. Available upon request to The Cincinnati Auto Supply Co., Cincinnati, Ohio.

"The Importance of Metals by Forging," a 44-page catalog available upon request to the Steel Improvement and Forge Co., 970 E. 14 St., Cleveland, Ohio.

"Regulation as a Tool in the Development of the Air Freight Industry," a 48-page report from the Virginia Law Review, Volume XXXIV, No. 3, October, 1941.

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CAB Should Order A Skyecoach Investigation

(Today's editorial has been written by AVIATION WEEK's Transport Editor)

The Civil Aeronautics Board's suggested withdrawal of the blanket exemption under which large irregular carriers operate poses a distinct threat to future development of low-cost air transportation.

As it now stands, CAB's contemplated action can rid the industry of some bad condition at the cost of putting nonscheduled out of business on a wholesale basis. But without the competitive spur of the independents, what would happen to the certified airlines' budding interest in skycoach operations?

If CAB comes through its proposal to snuff-out the nonscheduleds it should at least open a full-scale investigation into the merits of second-class air transportation as it did with regard to short-haul feeder services. Expedited action on the irregular operators' applications for certification would also appear to be in the public interest. CAB cannot afford to adopt an ostrich-like attitude toward the traffic-generating potentialities of the air coach.

Undoubtedly, irregular passenger lines on the transcontinental New York-Puerto Rico and Pacific Northwest-Alaska runs have operated in knowing and continued violation of the nonscheduled exemption as CAB interprets it. Cutthroat rate practices by some uncertified operators and ticket agents that have "beaten" for them have developed to an intolerable degree. Public enthusiasm for skycoaches has been dampened in ticket agents who advertise rock-bottom prices as a come-on and who vanish overnight with their receipts, leaving the customers stranded.

Passengers who buy skycoach tickets from Los Angeles to New York want to go to their deaths hit by a merrily direct routing, not via Boise to see the pilot's girl friend and via New Orleans to deboard the hotseat. They want to ride four-

engine equipment if they pay for such accommodations, and they don't want to pay \$120 for the same ride which the man in the adjoining seat bought for \$50. Most important, they want safe transportation, not overloaded, unsatisfactory equipment.

It has been CAB's responsibility to police two main aspects of nonscheduled operations and CAA's duty to keep unsafe equipment out of the air. Both have fallen down on their obligations—because of insufficient personnel or many cases CAB's contemplated revision of the nonscheduled exemption is tantamount to an admission that it is losing the legal game of tag it has been playing with the irregular lines, making new and drastic rules necessary.

Yet despite the numerous "black sheep" in their ranks, nonscheduled operators have made air transportation available to thousands of people for the first time. The overall air transportation market has been broadened during a period in which first-class travel, both surface and air, has contracted substantially.

It is doubtful that Pan American Airways and Capital Airlines would be offering skycoach services today but for the activities of irregular operators. Success of these two experiments has induced Northwest Airlines to ask CAB permission to offer four-cent-a-mile coach service between Washington and the Twin Cities—probably starting next month.

CAB's efforts to root out nonscheduled airline operations that give the entire air transport industry a black eye should get unusual support. At the same time, the Board should take care not to impose a death sentence on all irregular services without first giving the independent carriers a full opportunity to justify their continued existence.

CHARLES ADAMS

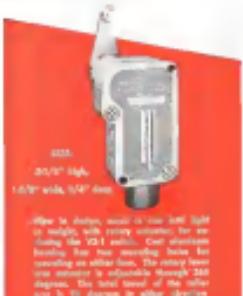
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